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# PILOT-OPERATED REGULATOR

## SUMMARY

INTRODUCTION .....	1
DESCRIPTION .....	1
CHARACTERISTICS .....	2
LABELLING .....	2
SPARE PARTS .....	3
OPERATION .....	5
DIMENSIONS AND WEIGHTS .....	6
INSTALLATION .....	7
COMMISSIONING .....	8
MAINTENANCE .....	9



Type EZR

## INTRODUCTION

The EZR is a pilot-operated regulator used in transmission and distribution networks or pipe lines supplying industries and commercial businesses.

The EZR can be equipped with a slam shut type OS2 (EZR body change) which permits the gas flow to be cut off rapidly and totally in the case of under or over outlet regulator pressure.

## DESCRIPTION

The EZR consists of:

### A version without integral slam shut:

- A body («E body» type), a bonnet
- A regulation subassembly consisting of a slotted cage and a diaphragm/plug
- A travel indicator, an inlet screen
- A pilot assembly consisting of a filter with bleeding screw (filtration 20 microns), an adjustable restrictor and a pilot set to the required outlet pressure

### A version with integral slam shut:

- A body («X body» type), a bonnet, a connecting part
- A regulation subassembly consisting of a slotted cage and a diaphragm/plug
- A travel indicator
- A pilot assembly consisting of a filter with bleeding screw (filtration 20 microns), an adjustable restrictor and a pilot adjusted to the required outlet pressure
- A removable slam shut orifice
- A integral O-ring tightshut valve/bypass assembly
- A release relay type OS2 according to NTAOS2:
  - a mechanism box (BM)
  - a safety manometric box (BMS) to be connected outlet side of the regulator

The EZR is in conformity with the  
PED 97/23/EC and is classified in category IV.

## CHARACTERISTICS

Operating pressure	PS	72.4 bar <sup>(1)</sup>	SLAM SHUT		
Operating temperature	TS	- 17 / 66 °C <sup>(1)</sup>	Accuracy	AG	2.5
REGULATOR			Set point range	Pt	up to 100 bar
Outlet pressure	Pa	0.5 to 48.3 bar	PILOT		
Minimum differential	ΔP min	2 to 3 bar	Type of pilot	Standard	161EB
Maximum operating differential	PN 20	18.6 bar	Monitor	161EBM	
	PN 50	50.0 bar	Manometric box	PS BMP	52 bar
	PN 100	55.2 bar	Fluid		
Max emergency differential	ΔP emerg	72.4 bar			
Accuracy	AC	2.5 - 5	Groups 1 and 2 according to PED 97/23/EC, 1 <sup>st</sup> et 2 <sup>nd</sup> family gas according to EN 437, or other gases (compressed air, nitrogen). The gas must be noncorrosive, clean (filtration on inlet side necessary) and dry		

(1) Values correspond to the characteristics of the regulator diaphragm

The regulator body and the slam shut have been designed to support different pressure and temperature levels

Body	P max (bar)	T min (°C)	T max (°C)
A216WCB	96.7	- 20	71
A352LCC	100	- 30	71

B05c

Flow coefficients and valve plug travel

Coefficients	Capacity	DN 25	DN 50	DN 80	DN 100	DN 150
Cg	100 %	480	1800	3400	5550	11200
	60 %	290	1020	1970	3300	7150
	30 %	140	560	970	1690	3570
C1	100 %	33	36	37	38	36
	60 %	29	28	29	27	30
	30 %	30	29	26	26	26
Valve plug travel (mm)		35	35	50	50	50

B05a

Pilot pressure ranges

BMP size	1	2	3	4	5	6	7	8
Spring colour	White	Yellow	Black	Green	Blue	Red	Blue	Red
Setting range (bar)	0.5	1.0	2.8	5.2	9.7	13.8	24.1	31.0
	1.0	2.8	5.2	9.7	13.8	24.1	31.0	48.3

B05b

## MATERIAL

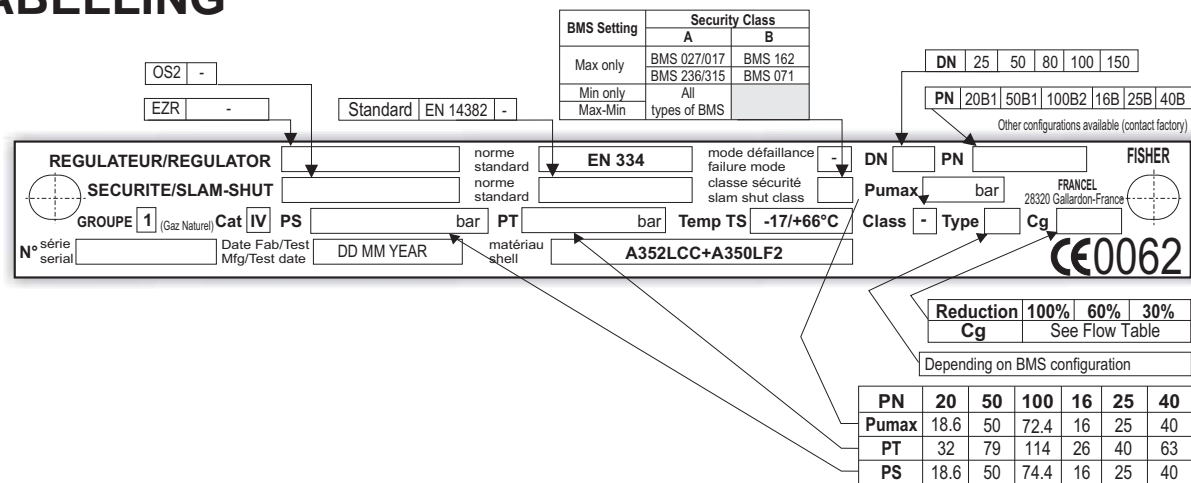
### Regulator

Body	Steel
Bonnet	Steel
Slotted disc	Stainless steel
Diaphragm, O-rings	Nitrile
Slam shut	
Connecting part	Steel
Orifice	Stainless steel
Valve plug	Stainless steel
Pilot	
Body	Stainless steel
Manometric box	Stainless steel or Aluminium
Restrictor	Stainless steel
Filter	Aluminium
Cartridge	Polythene

## CONNECTIONS

Inlet/Outlet:	ISO PN 100 B (ANSI 600 RF)
	ISO PN 50 B (ANSI 300 RF)
	ISO PN 20 B (ANSI 150 RF)
	Other possibilities exist (contact factory)
	ISO PN 16 B, 25 B, 40 B
Pilot Impulse line (IP):	1/4" NPT tapped
Pilot Monitor impulse line (IM):	1/4" NPT tapped
Intermediate impulse line (PI):	1/4" NPT tapped
Slam shut impulse line (IS):	1/4" NPT tapped
Mechanism box vent (E):	1/4" NPT tapped
Impulse diameter:	Pipe interior Ø 8/10mm min.

## LABELLING



E04a

Label for Type EZR Regulator with OS2 Slam Shut

# LABELLING

PN 20B1 50B1 100B2 16B 25B 40B  
Other configurations available (contact factory)

DN 25 50 80 100 150

**REGULATEUR/  
REGULATOR**

DN PN norme standard **EN 334**

mode défaillance  
failure mode - Type **DS** Cg

N° série  
serial Date Fab/Test  
Mfg/Test date

PS bar PT bar P<sub>umax</sub> bar

Temp TS -17/+66°C Class -

matériau  
shell **A352LCC+A350LF2**

GROUP 1 Cat IV **FISHER** FRANCE  
(Gaz Naturel) 28320 Gallardon-France **CE0062**

EZR

Reduction 100% 60% 30%  
Cg See Flow Table

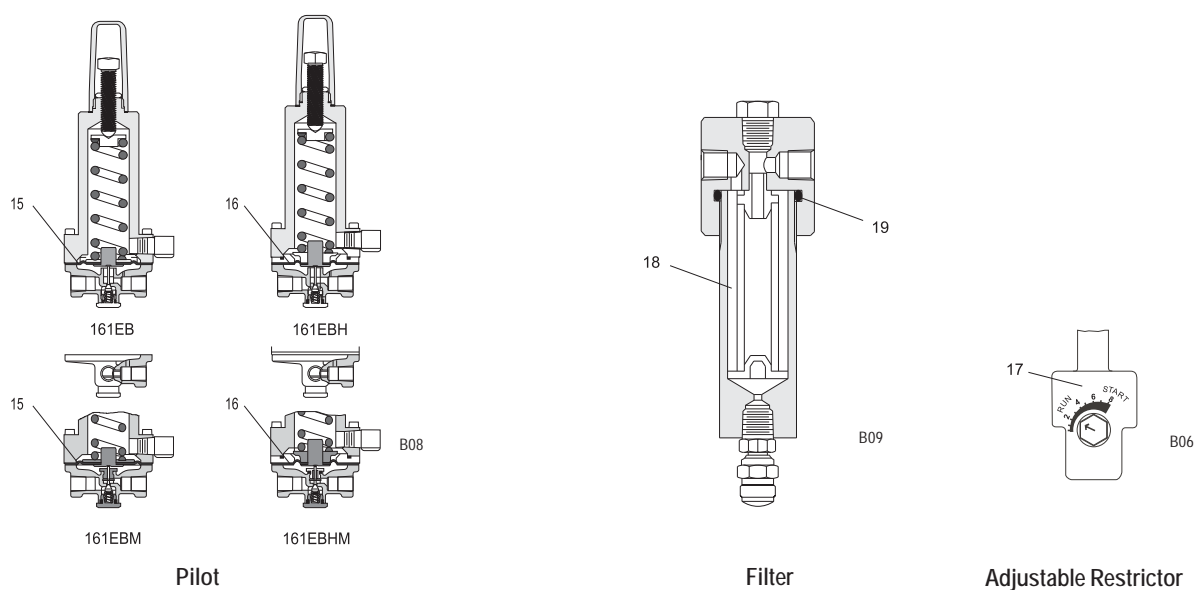
Date DD MM YEAR

PN	20	50	100	16	25	40
P <sub>umax</sub>	18.6	50	72.4	16	25	40
PT	32	79	114	26	40	63
PS	18.6	50	74.4	16	25	40

E04b

Label for Type EZR Regulator

# SPARE PARTS



Pilot, Restrictor, Filter spare parts

B11

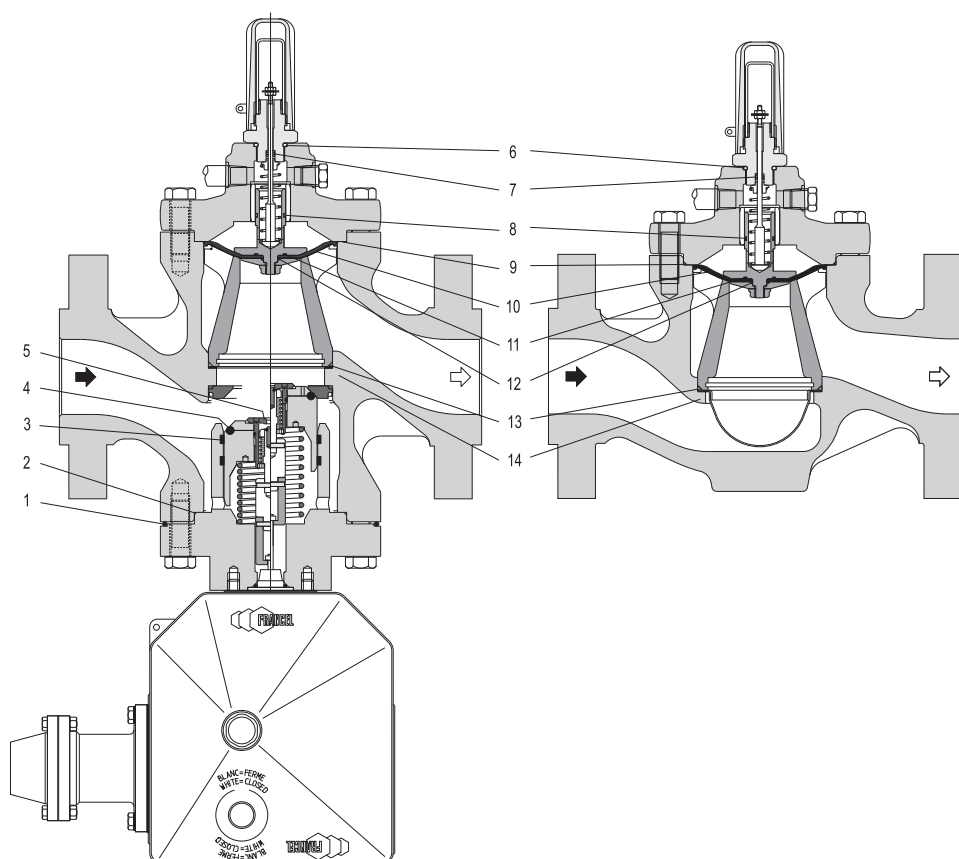
Pilot spare parts

Description	Item	Reference			
		Pilot type			
		161EB	161EBH	161EBM	161EBHM
Pilot kit 0.34 to 13.8 bar	15	R161X000012		R161MX00012	
Pilot kit 13.8 to 24.1 bar	15	R161X000022		R161MX00022	
Pilot kit EBH(M)	16		R161HX00012		R161HMX0012
O-ring	17	1C8538X0052			
Filter cartridge	18	17B6813X012			
O-ring	19	1F269206992			
SAV kit 0.34 to 13.8 bar <sup>(1)</sup>		197435		197438	
SAV kit 13.8 to 24.1 bar <sup>(1)</sup>		197436		197439	
SAV kit 24.1 to 48.3 bar <sup>(1)</sup>			197437		197440

(1) The SAV kits include item numbers 15 or 16, 17, 18, 19

To pass from 0.5 to 13.8 bar  
or from 24.1 to 48.3 bar the  
spring must be changed

## SPARE PARTS



B12

### EZR SPARE PARTS

Regulator	Description	Item	Reference				
			DN mm (inches)				
			25 (1")	50 (2")	80 (3")	100 (4")	150 (6")
EZR with slam shut	O-ring	1	400009	400024	400091	400045	400262
	O-ring	2	19B2838X012	18B2124X012	18B8514X012	18B2140X012	19B0359X012
	Guide	3	401950	401951	401952	401953	401954
	O-ring	4	400527	400263	400258	400260	400261
	Bypass	5	180977	180977	180977	180977	180977
	SAV kit PN 20	1 to 14	197421	197422	197424	197425	197427
	SAV kit PN 50/100	1 to 14	197421	197423	197424	197426	197427
EZR without slam shut	SAV kit PN 20	6 to 14	197428	197429	197431	197432	197434
	SAV kit PN 50/100	6 to 14	197428	197430	197431	197433	197434
EZR with/without slam shut	O-ring	6	18B3438X012	18B3438X012	10A8931X012	10A8931X012	10A3800X012
	O-ring	7	1H2926X0032	1H2926X0032	1D191706992	1D191706992	1D191706992
	O-ring	8	13A1584X052	13A1584X052	10A3803X062	10A3803X062	T12050X0012
	O-ring	9	19B2838X012	18B2124X012	18B8514X012	18B2140X012	19B0359X012
	PN 20 diaphragm	10	39B2397X012	29B2715X022	39B2726X012	38B5965X012	49B0357X012
	PN 50/100 diaphragm	10	39B2397X012	28B2123X052	39B2726X012	39B3996X012	49B0357X012
	O-ring	11	13A1584X052	13A1584X052	10A3803X062	10A3803X062	T12050X0012
	O-ring	12	1E216306992	1E26306992	1J4888X0052	1J4888X0052	11A8741X052
	O-ring	13	14A5713X012	10B4428X012	10B4366X012	10B4373X012	1H862306992
	O-ring	14					1D269206992
Safety manometric box			See NTAOS2 manual				

B13

## OPERATION

### REGULATOR

The EZR is a pilot-driven, diaphragm/plug regulator.

Tight shutoff is achieved by the diaphragm/plug pushing against the slotted cage, the force of the closing spring and the inlet pressure.

- **Opening**

As the flow increases, the outlet pressure  $P_a$  decreases on the outlet side of the regulator and on the pilot diaphragm.

Due to the force of the spring, the pilot opens.

The pilot flow increases, the pressure loss through the pilot restrictor increases.

The modulated pressure  $P_m$  decreases.

The force of the closing spring and that of the  $P_m$  becomes inferior to that provoked by the  $P_e$ , the regulator OPENS.

- **Closing**

As the flow decreases, the  $P_a$  increases outlet side of the regulator.

The force of the pilot diaphragm is overcome by the force of the spring, the pilot closes.

The pressure loss through the pilot restrictor decreases.

The force of the closing spring and that of the  $P_m$  becomes superior to that provoked by the  $P_e$ , the regulator CLOSES.

### SLAM SHUT

The pressure of the zone to be protected (generally the pipeline on the outlet side of the regulator and after the slam shut) is sensed by the safety manometric box (BMS).

If the pressure exceeds the set tripping pressure, the release relay frees the valve plug.

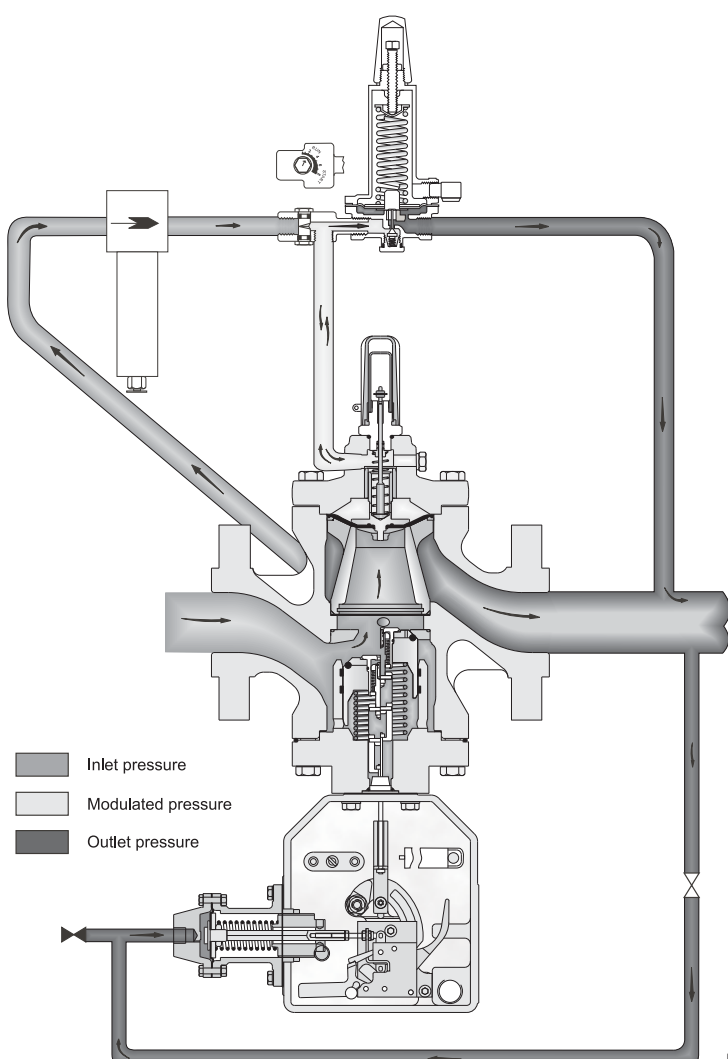
Due to the force of the closing spring and the fluid (trying to close), the valve plug closes on the orifice.

The gas flow is obstructed until the fault has been corrected and the mechanism box manually rearmed.

To reopen the valve plug an equal pressure balance on inlet and outlet sides of the regulator is required.

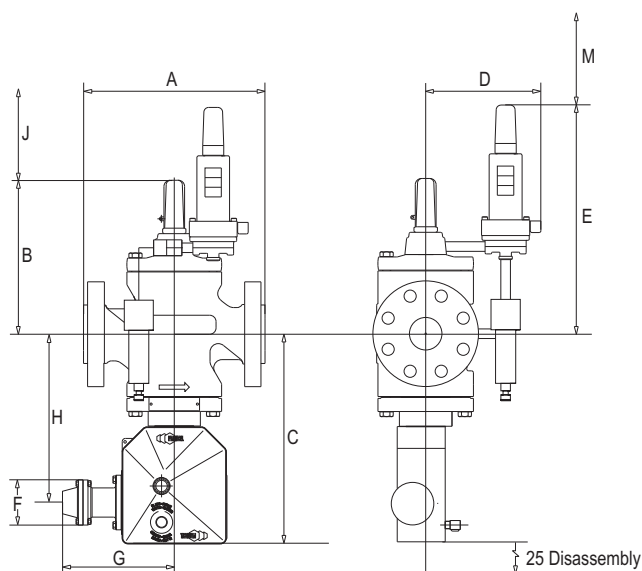
The mechanism box is rearmed after opening the internal bypass.

Rearming and balancing are achieved at the same time.



B18

## DIMENSIONS AND WEIGHTS



B14a

Dimensions with slam shut (mm)

Body DN	B	C	E	H
25	233	315	348	250
50	243	330	357	265
80	361	366	410	301
100	393	410	454	345
150	423	396	468	332

B15b

Regulator weight (kg)

Body DN	PN 20	PN 50	PN 100
25	20	21	22
50	39	41	43
80	63	69	71
100	104	113	123
150	192	211	244

B16b

Dimensions without slam shut (mm)

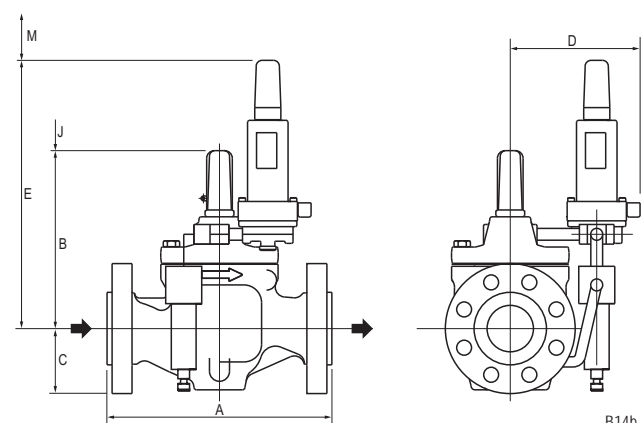
Body DN	B	C	E
25	220	62	335
50	226	83	340
80	343	105	392
100	372	137	433
150	420	178	465

B15a

Regulator weight (kg)

Body DN	PN 20	PN 50	PN 100
25	12	14	16
50	26	27	31
80	50	51	57
100	67	73	88
150	97	108	161

B16a



B14b

Body dimensions with/without integral slam shut (mm)

Body DN	A			D	J	M
	PN					
	20	50	100			
25 (1")	184	197	210	165	68	54
50 (2")	254	267	286	165	68	54
80 (3")	298	317	337	181	95	54
100 (4")	352	368	394	187	95	54
150 (6")	451	473	508	249	95	54

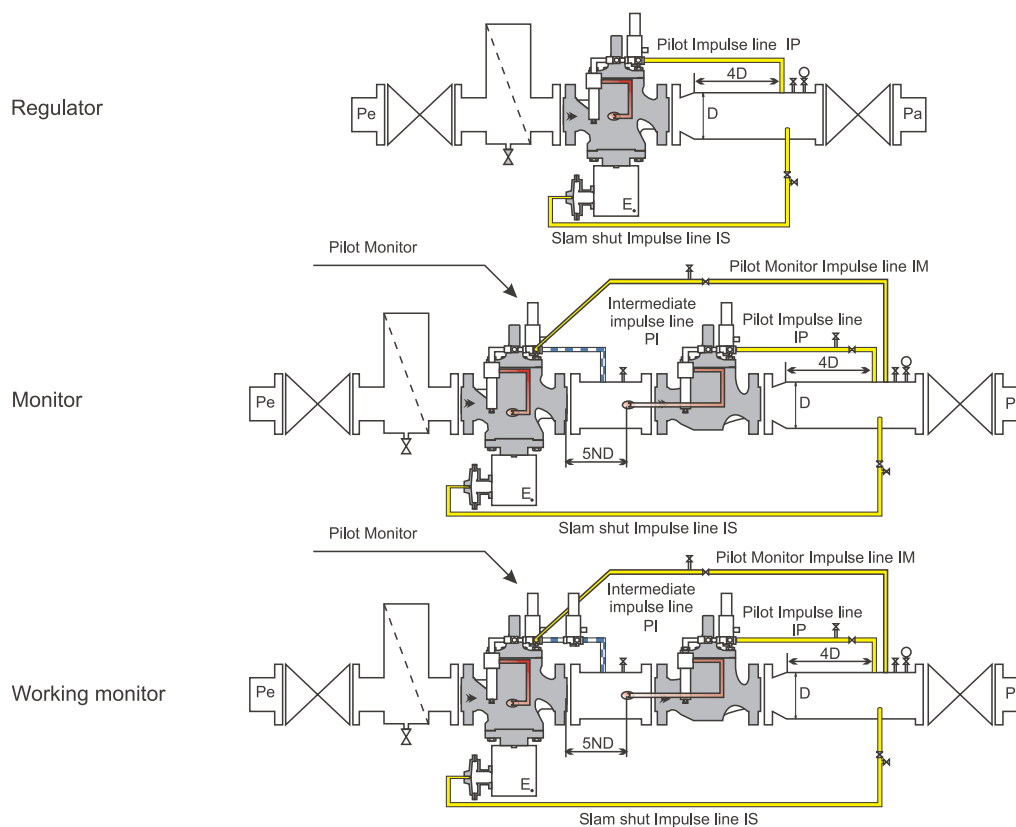
B17a

BMS  
(Safety Manometric Box)

Type	F	G
Diaphragm	162	181
Piston	71	204
Bellows	74	223

B17b

# INSTALLATION



B19

All interventions on the equipment should only be performed by qualified and trained personnel.



## WARNING

- The regulator is installed on horizontal pipeline. Version with slam shut, the release relay is situated towards the bottom (see schematic).
- Installation according to EN12186 recommended.
- Install according to direction of fluid flow (arrow).
- When assembling with adjacent elements care must be taken not to create pressure force on the body and the assembling elements (bolts, O-rings, flanges) should be compatible with the geometry and working conditions of the equipment.
- If the case arises a support must be used to avoid pressure force on the body (a support can be installed under the flanges).
- Version with integral slam shut, connect the safety manometric box (IS) to the impulse at 4D on a straight run of the outlet pipe.
- It is recommended to separate the slam shut impulse line (IS) from that of the pilot (IP). Do not connect the impulses on the lower generator line.
- It is recommended to install an isolation valve and an atmospheric valve, which can be useful for slam shut tripping and verifications.
- No modification should be made to the structure of the equipment (drilling, grinding, soldering...).



## WARNING

- It is recommended to install a servicing valve on the outlet pipeline to facilitate adjustments and bleeding off to the atmosphere.
- Verify that the inlet side is protected by an appropriate device(s) to avoid exceeding the limits of utilization (PS, TS).
- Verify that the limits of utilization correspond to the appropriate operating conditions.
- Version with integral slam shut, verify that the safety manometric box (BMS) and spring correspond to the appropriate operating conditions on the outlet side of the regulator.
- The equipment should not receive any type of shock, especially the release relay.
- The user should verify or carry out a protection adapted to the environment.
- Fire, seismic and lightening are not taken into consideration in standard regulators. If required, a special product selection and/or specific calculations may be supplied according to specific requirements.
- Version without integral slam shut, verify that a pressure limiting device on the outlet side of the regulator guarantees a pressure limit inferior or equal to the pilot PS.

# COMMISSIONING

*Operations concerning the integral slam shut version are in italic.*

All interventions on equipment should only be performed by qualified personnel

## PRELIMINARY VERIFICATIONS

### Start-up positions

- Inlet and outlet valves  
→ Closed  
Verify the absence of pressure between inlet and outlet valves
- Slam shut valve plug  
→ Closed
- Pilot A  
→ Unloaded
- Restriction B  
→ START position

### Slam shut set point verification

*Using the atmospheric valve, inject a pressure equal to the pressure required for the regulator*

- 1<sup>st</sup> release relay stage  
→ Set (Stage 1)
- Slam shut valve plug  
→ Open (Stages 2 & 3)  
→ Progressively increase the pressure to reach tripping  
→ Adjust setting if necessary (NTAOS2)  
**Note the set point value on the equipment or mark it on a commissioning document**

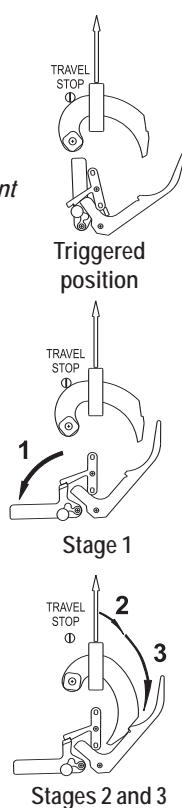
### Positions before commissioning

- Impulse line isolating valve  
→ Open
- Impulse line atmospheric valve  
→ Closed
- Slam shut valve plug  
→ Closed
- Servicing valve  
→ Closed

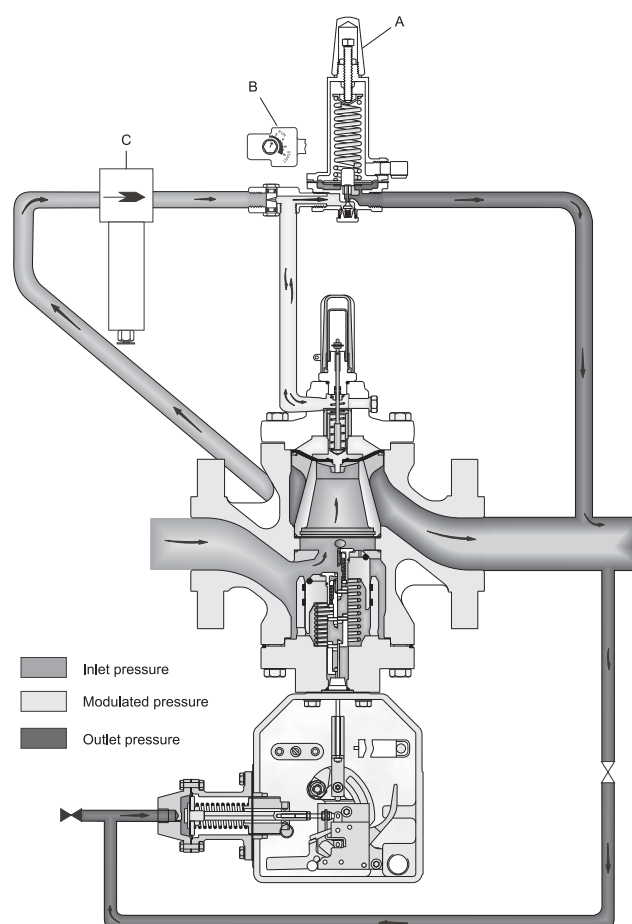
The equipment is ready for commissioning

## COMMISSIONING (Act slowly)

- Inlet valve  
→ Open very slowly
- 1<sup>st</sup> release relay stage  
→ Set (Stage 1)
- Slam shut valve plug  
→ Bypass (Stage 2)  
→ Open (Stage 3)



B20



B22

- Servicing valve  
→ Open slightly
- Pilot  
→ Screw to set outlet pressure
- Outlet valve  
→ Open slowly
- Restriction  
→ Set to "RUN" by successive fractions 2, 4 or 6
- Servicing valve  
→ Closed

The equipment is commissioned

*It is recommended to seal the release relay*



# MAINTENANCE

*Operations concerning the integral slam shut version are in italic.*

## SERVICING CHECK

Recommended frequency:

- Twice yearly minimum

Verification:

- Set point verification
- Regulator valve plug tightness
- *Tripping and set point value*
- *Slam shut valve tightness*

## Departure positions

- Inlet valve → Open
- Outlet valve → Open
- *Slam shut valve plug* → *Open*
- Regulator → In operation

Inlet and outlet sides of regulator under pressure

## Tightshut verification (*and tripping verification for integral slam shut versions*)

- Inlet valve → Closed
- Outlet valve → Closed
- Regulator Observe the evolution of the outlet pressure (control regulator tightness)

If the outlet pressure increases	Internal leak Control the regulator valve plug Control the regulator orifice Control the pilot or contact after-sales
If the outlet pressure decreases	External leak Locate and seal the leak or contact after-sales
If the outlet pressure is constant	<i>The regulator is tightshut</i> <i>Increase the set point until tripping occurs</i> <i>(without exceeding the outlet limits)</i>
<i>If the slam shut valve plug will not close</i>	<i>Operating fault</i> <i>Control the release relay</i> <i>Control the slam shut valve plug</i> or contact after-sales
<i>If the slam shut valve plug closes</i> <i>Observe the evolution of the outlet pressure (control tightness)</i>	<i>Operating correctly</i>
If the outlet pressure is constant Observe the evolution of the outlet pressure (control tightness)	Purge the outlet side of the regulator
<i>If the outlet pressure increases</i>	<i>Internal leak</i> <i>Control the slam shut valve plug</i> <i>Control the slam shut orifice</i> <i>Control the bypass</i> or contact after-sales
<i>If the outlet pressure is constant</i>	<i>Slam shut valve plug is tightshut</i>

## Filter verification

- Purge the filter C
- Verify the cartridge

# MAINTENANCE

## DISASSEMBLY

Recommended frequency:  
Every 2 to 6 years (or less depending on operating conditions)

Verification:  
Condition of O-rings, diaphragms, lubrication

Replacement:  
O-rings, diaphragm

Tools:  
Dimensions according to tables below

## PRELIMINARY OPERATIONS

- Valve plug closed
- Inlet and outlet valves closed
- **Bleed off outlet pressure**
- **Bleed off inlet pressure**
- Unscrew the pilot impulse connection
- Unscrew the screws 1 fixing the bonnet 2
- Remove the bonnet 2
- Remove the diaphragm/plug assembly 3
- Remove the slotted cage 4, the O-ring 5, the strainer 6  
(or the space washer 6)
- Clean parts and replace them if necessary

## PILOT

- Unscrew the manometric box screws
- Remove the diaphragm

## SLAM SHUT (Version with slam shut)

- Unscrew the BMS impulse line connector (IS)
- Remove the BM cover 7
- Unscrew the BM fixing screw 8
- Remove the holding pin 10
- Remove the BM 9
- Unscrew the screws 11 from the connecting part 12
- Remove the connecting part 12
- Remove the spring 13 and the valve plug 14
- Unscrew the bypass 15
- Unscrew the screws CHC 16 (DN 100 and 150)

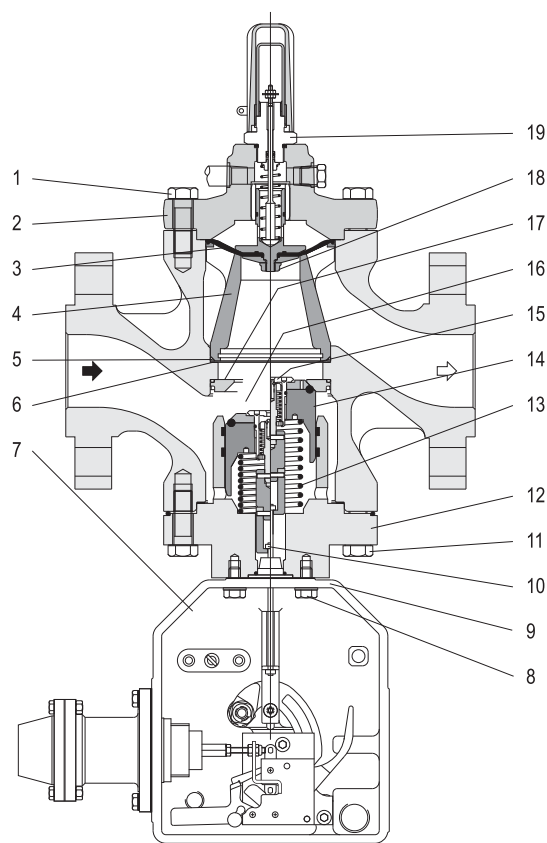
Removing the orifice 17 (not recommended) requires a special extraction tool

## REASSEMBLY

- Perform the above operations in reverse order (respect tightening torques)
- Replace the O-rings and diaphragm at each disassembly

## SLAM SHUT REASSEMBLY (Version with slam shut)

- The valve plug should be held in an upper position using a packing gland and a box to facilitate reassembly
- Precaution must be taken concerning the passage of the valve plug over the segments
- Lubricate screws before tightening
- Lightly lubricate the O-rings (silicone grease) except for the valve plug O-ring
- Lightly lubricate the stem (silicone grease)
- Lubricate the release relay mechanism (yoke and bolt) (molybdenum graphite grease)
- Lubricate the BMS spring (molybdenum graphite grease)
- A special tool is required for reassembling a new orifice



B24

Body DN	Screws Items 1 and 11	Spanner (inches)
25 (1")	9/16 - 12 x 1 3/4	13/16
50 (2")	1/2 - 13 x 1 1/2	3/4
80 (3")	5/8 - 11 x 1 3/4	15/16
100 (4")	3/4 - 10 x 2 1/4	1 1/8
150 (6")	1 - 8 x 2 3/4	1 1/2

B25a

Body DN	Torque N.m.			
	Screw Item 1 & 11	Fixation Item 18	Connector Item 19	Bypass Item 15
25 (1")	110	8	130	14
50 (2")	110	9	130	14
80 (3")	175	28	280	20
100 (4")	260	28	280	24
150 (6")	510	70	410	24

B25b

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